
Principles of Tectonic Mapping Based Upon Plate Tectonic Theory

by J.D. Kepple



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BASED UPON PLATE TECTONIC
THEORY

by
J. D. Keppie

Honourable Ronald Barkhouse, Minister
John J. Laffin, P. Eng., Deputy Minister

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ABSTRACT

A tectonic map attempts to portray the origin and evolution, in space and time, of a region. Plate tectonic concepts have been successfully applied to the Phanerozoic and Proterozoic. Their application to the Archean is still under debate. The advent of plate tectonics heralds a new generation of tectonic maps for most of the earth's surface, namely that part underlain by Phanerozoic and Proterozoic rocks. It may be necessary to base tectonic mapping of Archean terrains upon an alternative tectonic model. In tectonic mapping of the Province of Nova Scotia, Canada, using plate tectonic theory, three hierarchical categories of rocks are recognized: zones, stages and elements.

A tectonic zone is defined as an area characterized by the nature of the underlying crust (continental, transitional or oceanic) at the time the rocks were formed and is bounded in time by orogenies.

A tectonic stage is defined as a phase of tectonic development forming part of a tectonic zone and characterized by an association of tectonic elements. The following stages are recognized: stable, rift, atlantic, pacific and transpression stages.

A tectonic element is defined as a certain, specific, well defined tectonic environment and characterized by a distinct tectonostratigraphic or tectono-plutonic rock unit which is part of a tectonic zone or stage. Examples of tectonic elements are: continental shelf, forearc basin, marginal basin, and magmatic arc. These tectonic units may exist side by side at any point in time, and conversely any area may belong to several different tectonic units as it evolves through time.

Potentially, this scheme of tectonic mapping has worldwide applicability. The scale of a tectonic map controls the degree of subdivision depicted. Thus, on small scale maps only tectonic zones may be shown, intermediate scale maps may include tectonic zones, stages and possibly combinations of elements, and large scale maps can portray all three categories.

Structural elements including fold traces, foliations and faults, may also be plotted on a tectonic map as may be structure contours in undeformed or mildly deformed basins and the axes of gravity and magnetic anomalies.

INTRODUCTION

Before embarking upon a discussion of tectonic mapping it is essential to clarify the terms tectonics and structural geology. Although structural geology is adequately defined in texts and geological dictionaries, the definition of tec-

tonics ranges from being synonymous with structural geology (Schieferdecker, 1959; De Sitter, 1956) to statements that tectonics is an independent branch of geology (Hills, 1963; Badgley, 1965; Bates and Jackson, 1980). The definitions preferred by this author are as follows:

Structural geology deals with the form, arrangement and internal structure of rocks, and especially with the description, representation and analysis of structures, chiefly on a moderate to large scale. It follows that a structural map depicts the age and orientation of structures such as folds, faults, foliations etc. and is predominantly objective.

Tectonics is the study of the broad architecture of the outer part of the Earth, the regional assembling of structural features and tectonic units, and their mutual relations, origin, and historical evolution (Bates and Jackson, 1980). Thus, a tectonic map illustrates the evolution of the architecture of the earth's crust in time and is interpretive. Tectonic mapping involves a degree of subjectivity which becomes more objective as the properties of individual tectonic units are better understood. Tectonic maps display tectonic units in their present locations and are considerably more objective than pre-Mesozoic paleotectonic maps which involve palinspastics based upon relatively limited data.

At present, tectonic maps are available for most countries in the world. A history of tectonic mapping is available in King (1969) and Scheibner (1972) and will not be reproduced here. According to the above preferred definitions, some of these so-called tectonic maps are better considered as structural, and the first genuine tectonic map was produced by Argand (1924). Considerable progress has been achieved in the intervening period. However, most of these tectonic maps have been based upon the outdated geosynclinal theory (Coney, 1970), including many of those produced since the advent of plate tectonics nearly two decades ago.

Several recent maps which have been based upon plate tectonic theory are the Tectonic Map of Canada (Douglas, 1973), the Tectonic Map of New South Wales (Scheibner, 1974, 1976), the Tectonic Map of the Indonesian Region (Hamilton, 1978, 1979), and the Tectonic Lithofacies Map of the Appalachian Orogen (Williams, 1978). These recent tectonic maps show considerable variation in their legends probably due in large part to the rapid evolution of plate tectonic theory since its inception. This paper presents a more formal scheme based upon plate tectonic theory devised for the Tectonic Map of Nova Scotia (Keppie, 1982), and which, it is hoped, will find worldwide applications.

PLATE TECTONIC THEORY

Several books and numerous papers have been written on the subject of plate tectonics (e.g. Le Pichon et al., 1973; Talwani and Pitman, 1977; Dewey and Bird, 1970; Dewey, 1977; and many others) and they will not be reproduced here. A short summary of the basic tenets of plate tectonics is presented.

Plate tectonic theory is based upon the premise that the earth's surface is divided into a number of rigid to partly rigid lithospheric plates up to 150 km thick. These plates are in relative motion on a low velocity layer at the top of the asthenosphere. Three types of plate margins are recognized:

- (i) Accreting plate margins occur where plates move away from each other and new lithosphere is created in the zone of extension between the plates. They are found mainly in the mid-oceanic ridges, although some generation of lithosphere also occurs in some small ocean basins, rift valleys and aulacogens.
- (ii) Consuming plate margins occur where plates move toward each other, and lithosphere is subducted into the asthenosphere. They are marked by trenches associated with island arcs and andean-type continental margins. Obduction and flake tectonics may also take place at these convergent margins.
- (iii) Transform faults occur where the lithospheric plates move relatively by a pure strike-slip motion. Some transform faults are associated with secondary seafloor spreading (leaking transform faults) whereas others may suffer some compression.

Plate tectonics is inferred to be a manifestation of mantle convection through a process of degassing, overturn, and vertical and lateral differentiation ultimately producing continental crust (Ringwood, 1969, 1972). Vertical differentiation was probably dominant in the early stages of proto-mantle development, whereas lateral differentiation was predominant during the plate

tectonic regime and generated new lithosphere in seafloor spreading centres and in subduction zones.

Plate tectonic theory was developed for the ocean basins and its rules can be quantitatively applied to only the Mesozoic and Cenozoic history of oceanic plates for which such information as spreading velocities, first motion solutions, orientations of transform faults etc. are available (Le Pichon et al., 1973). Nevertheless, plate tectonic theory has been applied qualitatively to many continental areas around the world. Most of these models explain the geology of areas which were, or are presently, continental margins, i.e. passive continental margins or consuming plate boundaries where orogens are formed. Such models form the essential part of any tectonic map because once an area is cratonized it is generally covered by relatively simple platform cover rocks. With the increase in the diversity and amount of geological data relating to Mesozoic/Cenozoic plate margins and older parts of the geological record, plate tectonic models become more objective. At this point, it should be stressed that data from all subdisciplines of solid earth science are essential to an integrated model. Such integrated models have been generated for orogens as old as the earliest Proterozoic (Hoffman, 1980). Cogent theoretical arguments have been put forward for plate tectonics in the Late Archean (Burke et al., 1976), however, no consensus is presently available (Kerr, 1978). Burke and Dewey (1973) have proposed that the plate tectonic regime was preceded by a permobile phase characterized by rapid convective circulation in the mantle and a thin lithosphere. If this is the case, then a modified tectonic model is a necessary prerequisite for producing a tectonic map for most of the Archean. On an areal basis, the Archean cratons occupy only a small proportion of the earth's surface.

PRINCIPLES OF TECTONIC MAPPING

It follows from the definition of tectonics adopted earlier that a tectonic map portrays at least three types of information: tectonic units, structural units and elements and the shape of basins. In order to arrive at the most objective tectonic interpretation of any unit it is necessary to compile and analyze as complete a range of geological parameters as possible, such as

stratigraphy, paleontology, structure, volcanism, plutonism, metamorphism, geochronology, geophysics, etc. These parameters are initially compiled in correlation charts or time/space diagrams. This allows tectonostratigraphic units to be defined which, following deposition, are transformed by deformation and metamorphism. It follows that geological, structural and metamorphic maps combined with geophysical data: gravity, magnetic and seismic (e.g. Keppie et al., 1979), which aid definition of the structure beneath the surface, are essential prerequisites to the preparation of a tectonic map. Palaeostatic maps and sections, and tectonograms follow from the tectonic map.

Of the recent tectonic maps based upon plate tectonic theory, a variety of tectonic units are shown for stratified rocks such as oceanic crust, melange, outer-arc basin, foreland basin, platform cover, continental slope and rise etc., but plutonic rocks generally are not classified tectonically. Only on the Tectonic Map of New South Wales (Scheibner, 1974, 1976) is any systematic attempt made to categorize these tectonic units into tectonic stages, provinces and realms. Unfortunately, little distinction is made between these higher ranking tectonic units. With these considerations in mind, coupled with recent advancements in plate tectonic theory, the present author devised a new scheme for tectonic mapping of the Province of Nova Scotia (Keppie, 1982).

In the present scheme, three hierarchical categories of tectonic units are recognized: zones, stages and elements (Fig. 1, Table 1). Tectonic mapping proceeds by first defining the tectonic elements, which are then grouped into higher ranking tectonic units, stages and zones.

TECTONIC UNITS

Tectonic Elements

A tectonic element is defined as a certain, specific, well-defined tectonic environment recorded by the rocks, which is part of a tectonic zone or stage and characterized by a distinct tectonostratigraphic or tectono-plutonic rock unit.

Tectonic elements are defined by their geological properties and may be grouped into the higher ranking tectonic units, stages and zones.

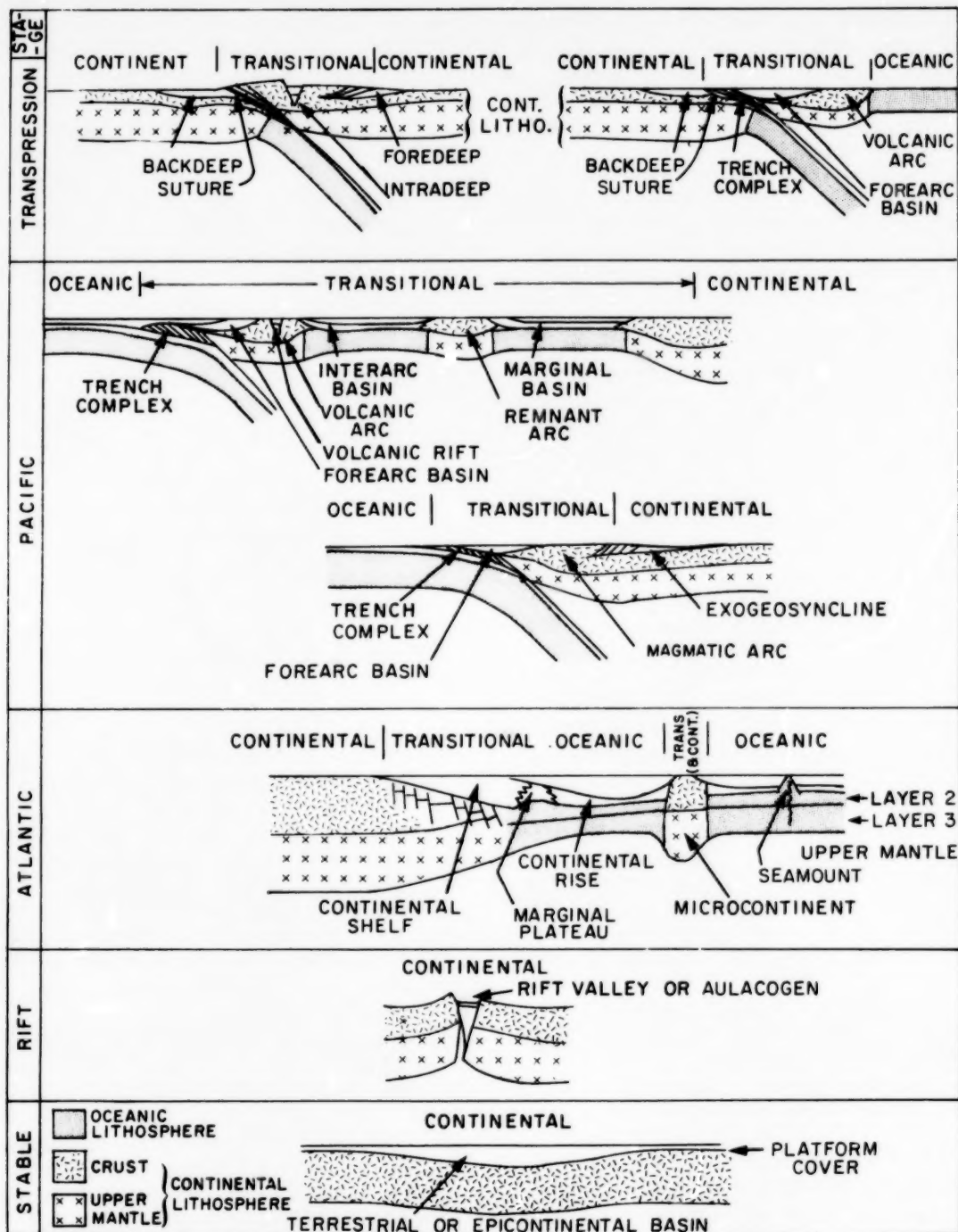


Figure 1. Tectonic zones, stages and elements. Note that tectonic stages can also coexist in space at any one time.

TABLE 1. Classification and characteristic geological properties of tectonic stages and tectonic elements. Note that no cycle of tectonic stages is implied because many lines of evolution can occur in plate tectonics.

TECTONIC STAGE Map notation indicated Basic colours	TECTONIC ELEMENT Map notation indicated, shades of basic colours. Other elements are possible	CHARACTERISTIC GEOLOGICAL PROPERTIES				
		SEDIMENTARY	IGNEOUS	STRUCTURAL	METAMORPHIC	MINERALIZATION
STABLE(s)	Epicontinental basin (eb) Terrestrial basin (tb) Platform cover (c)	Shallow marine Continental Thin marine &/or continental	Rare alkalic volcanism &/or plutonism	Generally absent or weak: domes, basins, monoclines	Absent	Fe-Nb, Oil & gas U, non-metallic Sn-F-Mb
END OF OROGENIC ACTIVITY						
TRANSPRESSION (t)	s type plutons (s) is type plutons (is)	-	Granite, granodiorite, Alaskan-type gabbro-peridotite intrusives	Calderas, ring complexes Concentric shape	-	Sn-M-F-U Ti-Fe-Cr-Pt
	Volcanic rift (vr) Backdeep (bd) Intradeep, intramontane depression (id) Foredeep (fd) Foreland basin (fb)	Molasse: terrestrial to shallow marine	Alkalic- tholeiitic bimodal volcan- ism, some calcalkalic	Deformed with & next to the orogen, else- where undeformed; transcurrent faulting, paratectonic	Low tempera- ture burial metamorphism may occur	Pb-Zn-Cu-U-Ag
INITIATION OF SUTURING AND APPEARANCE OF MOLASSE						
PACIFIC (p)	Marginal or backarc basin (mb) Interarc basin (iab) Periarc basin (pb) Oceanic crust layers 1, 2 & 3 (oc1, oc2, oc3) Upper Mantle (um)	Volcaniclastic flysch, pelagic sediments on oceanic litho- sphere	Ocean floor & mid-ocean ridge tholeiitic basalts, gabbroic intrusives, ophiolite	Variable: gentle to intense deformation	Low grade to regional high T/P	Cyprus-type Cu-Fe, Au-Ag, Cu-Ni-Pt
	Oceanic seamount (s)	Exotic shallow water sediments	Alkalic-tholeiitic oceanic island volcanism	Variable: gentle to intense deformation	Low grade	
	Peripheral basin (ppb) Retro-arc basin (rab)	Widflysch, flysch, shale	Shoshonitic volcanics, alkalic pluton	Magpe emplacement, gentle-intense deformation	Grade: Low- high T/P	Pb-Zn-Cu-U
	i type Magmatic arc	Flysch	Calcalkaline an- desites, rhyolites & basalts, & syn- tectonic pluton- ism	Generally intense polyphase, sometimes gentle deformation, orthotectonic	Low grade to regional high T/P & medium T/P	Porphyry Cu-Mo & Au, Sn-W-Ag Sb
	Volcanic arc rift (var) in volcanic & magmatic arcs	Submarine &/or subaerial volcaniclastics, greywacke	Igimbrites, some calcalkaline volcanics	Graben: variable subsequent deformation	Variable	Kuroko-type Cu-Pb-Zn
	Volcanic arc (va) Remnant arc (ra)	Submarine &/or subaerial volcaniclastics, greywacke	Volcanism: (iii) Shoshonitic (ii) Calcalkaline (i) Low-K tholeiitic syntectonic plutonism	Variable: gentle to intense deformation. Orthotectonic	Low grade to regional high T/P & medium T/P	Porphyry Cu-Au Besshi-type Cu-Fe, Hg, As, S-Fe
	Forearc basin (fab)	Pyroclastics, clastic terres- trial & shelf sediments, bio- genic sediments	Pyroclastics	Variable: gentle to intense deformation	Subgreenschist facies	Au Hg
	Trench complex (tc)	Accretionary prism of flysch, olistostromes, oceanic sediments & disseminated ophiolite, melange	Oceanic layer 2, Mid-oceanic ridge basalts	Concave upward, imbricate thrusts, Variable degree of folding	Blue schist facies, high P/T	Cyprus-type Cu-Fe, Hg, Ag
START OF SUBDUCTION, APPEARANCE OF SUBDUCTION COMPLEX AND CALCALKALINE VOLCANISM						
ATLANTIC (a)	Microcontinent (mc) Microcontinental submarine platform (mcsp)	Relatively thin, shallow water to moderately deep water sediments on drowned platform	Rare	Variable: gentle to intense deformation	Low grade to regional high T/P & medium T/P	
	Oceanic seamount (s)	Exotic shallow water sediments	Alkalic-tholeiitic oceanic island volcanism	Variable: gentle to intense deformation	Low grade	
	Oceanic lithosphere, ophiolite (o) Oceanic crust layers 1, 2 & 3 (oc1, oc2, oc3) upper mantle (um) mid-oceanic ridge (mor)	Pelagic sediments on oceanic lithosphere	Mafic, mor, abyssal tholeiitic volcanics, sheeted dyke complex, basic & ultrabasic complex	Undeformed to highly deformed	Zeolite- greenschist (-amphibolite) facies	Cyprus-type Cu-Pb-Zn, Fe, Mo, As, S, Zn, Ag, Hg in sediments, Podiform Cr, Ni, Pt
	Continental slope & rise (cr)	Turbidite fans	Rare	Intense deformation	Low grade to high T/P	Oil & gas
	Marginal plateau (mp)	Shelf edge car- bonate bank or reef, shoals	-	Variable	Low grade to high T/P	Oil & gas
	Continental shelf (cs) Basaltic plateau (bp)	Neritic, littoral & sub-littoral sediments	Tholeiitic plateau basalts at base	Fold & thrust belt	Absent-Low grade	Metal-rich muds (Zn, Cu) Mississippi Valley Pb-Zn- Ba, Oil & Gas
START OF SPREADING ASSOCIATED WITH AXIAL DYKE AND PLATEAU BASALTS						
RIFT (r)	Alkalic intrusives (ak) Volcanic rift (vr)	-	Alkaline volcanism & intrusives, carbonitites, kimberlites	-	-	Sn-F-Mb Fe-Nb-P, Ba-F- REE
	Rift valley (r) Aulacogen (a)	Terrestrial to shallow marine, evaporites	Alkalic, mainly in rift valleys	Faulting	Low grade meta- morphism	Sulphide-type Pb-Zn-Ag, Mississippi Valley Pb-Zn- Ba, Oil & Gas
DEEP CRUSTAL FAULTING						
STABLE(s)	As above	As above	As above	As above	As above	As above

A plethora of names abound in the literature for tectonic elements. Some that may be used in tectonic mapping are illustrated and tabulated with their properties here (Fig. 1, Table 1). This list is open-ended and others may be included in the future as they become defined. Some of these tectonic elements require more precise definitions than current usage allows. These will not be included here.

Tectonic Stages

A tectonic stage is defined as a phase of tectonic development forming part of a tectonic zone and characterized by an association of tectonic elements. The following stages are recognized: stable, rift, atlantic, pacific and transpression.

Although a great number of stages or phases in tectonic evolution have been recognized in modern plate tectonic settings (e.g. Burke and Whiteman, 1973; Dewey, 1969; Dewey and Horsfield, 1970; Keen, 1979; Dewey and Bird, 1970; Dickinson, 1977) only the main stages can be reasonably clearly identified in ancient orogenic belts. These stages are named in the preceding definition (Fig. 1, Table 1). Others may be classified as sub-stages. For example, the sub-stages of the rifting stage might be uplift, alkaline volcanism, rifting with or without crystal melting and RRR junction formation (Burke and Whiteman, 1973). If subduction of the mid-oceanic ridge can be recognized, it would be possible to separate out a mediterranean sub-stage of the pacific stage (Dewey, 1969). However, it is difficult to define unequivocal boundaries between sub-stages and so they are not used in the present scheme. It may be possible to better define sub-stages at some future date.

The stable tectonic stage is represented by the cratonic cover deposits. The rift tectonic stage is characterized by aulacogens, half grabens and rift valleys and the terrestrial deposits therein, and alkalic volcanism (Freund, 1965; Cherkunov, 1967; Illies, 1969; Burke and Whiteman, 1973). The boundary between the stable and rift stages is placed at the initiation of the bounding faults. These two stages occur in the continental and transitional tectonic zones.

The atlantic tectonic stage is typified by the present spreading Atlantic Ocean and is char-

acterized by continental shelf and rise and ocean floor deposits. The initiation of the atlantic stage is defined by the beginning of spreading, i.e. the appearance of new oceanic crust in an axial dyke accompanied by plateau basalts and dyke swarm feeders. This tectonic stage may occur in all three tectonic zones.

The pacific tectonic stage is typified by the present Pacific Ocean in which the mid-oceanic ridge has, in places, been subducted. It is characterized by island arc complexes and cordilleran-type continental margins (Dewey and Horsfield, 1970). The initiation of the pacific stage is defined by the start of subduction i.e. the formation of Franciscan facies melanges followed by calc-alkaline volcanicity. This tectonic stage may occur in all three tectonic zones.

The transpression tectonic stage is characterized by molasse deposited in foredeeps, intra-deeps and backdeeps, alkalic-tholeiitic volcanism, and ring complexes and calderas, which are usually deformed by transpression (folding and transcurrent faulting) but are rarely metamorphosed. During this stage the relative motion may vary from perpendicular, through oblique to parallel, and depending on the shape of the margin, whether S or Z, zones of compression or tension may form. The start of the transpression stage is defined by the time of suturing and the start of molasse deposition. This tectonic stage may also occur in all three tectonic zones.

Although the tectonic stages have been described in a sequence which might be considered an ideal tectonic cycle, no deterministic sequence of events may be assumed in plate tectonic theory because, for example, crustal separation can occur at anytime in any place (Coney, 1970). It should also be noted that the boundaries between tectonic stages are often diachronous.

Tectonic Zones

A tectonic zone is defined as an area characterized by the nature of the underlying crust (continental, transitional or oceanic) at the time the rocks were formed and is bounded in time by orogenies. An exception is the present phase of tectonic evolution which is incomplete.

The oceanic tectonic zone (similar to oceanic realm and tectonic province of Scheibner,

1976) is characterized by the presence of oceanic lithosphere: oceanic crust and upper mantle. Its thickness and the depth of the ocean increases proportionately away from the midoceanic ridges according to its cooling rate and age (Rona, 1973). The average thickness of the oceanic lithosphere is 70 km. The oceanic crust is generally made up of three layers: layer 1, pelagic and hemipelagic sediments up to about 500 m thick; layer 2, submarine abyssal tholeiitic basic flows 100-2000 m thick; and layer 3, greenschist facies meta-basalts, amphibolites and gabbros about 5 km thick. Sheeted dyke complexes are typical of the boundary between layers 2 and 3.

The upper mantle consists of ultrabasic rocks such as harzburgite, lherzolite, and peridotite. The oceanic tectonic zone is only rarely preserved in orogenic belts as it generally disappears down subduction zones. Problems in identifying rock complexes formed in ancient oceanic zones arise because complexes formed in small ocean basins are sometimes similar to those in large ocean basins, and also, cases occur where the oceanic basement is not exposed. The oceanic zone may also include a variety of tectonic elements such as microcontinents, seamounts, submarine platforms, volcanic arcs, forearc and backarc basins, etc. Each of these tectonic elements is underlain by either continental, transitional or oceanic crust. Many of these tectonic elements are accreted to one another and with a continental margin to form terranes in an orogenic belt (Coney et al., 1980; Keppie, 1981) during the Pacific tectonic stage.

The continental tectonic zone (similar to the continental realm and epi-cratonic tectonic province of Scheibner, 1976) is characterized by cratonic covers on platforms overlying continental lithosphere. The continental lithosphere, with an average thickness of 150-250 km, is composed of continental crust (c.35 km) made up of an upper "granitic" crust and a lower "basaltic" crust overlying upper mantle possibly of depleted residual peridotitic composition (Ringwood, 1969). Rocks deposited in the continental tectonic zone accumulate in epicontinental basins or synclises, aulacogens, rift valleys, on stable shelves with normal thickness of continental crust and in peripheral and retro-arc basins and foredeeps. Sedimentation is either terrestrial, or marine deposited in epicontinental seas.

Alkalic and peralkalic volcanism and rare plutonism, and plateau basalts may occur in the continental tectonic zone. Mild deformation, block faulting and broad warping are also to be found in this zone.

The transitional tectonic zone (similar to the transitional realm, and precratonic and transitional tectonic provinces of Scheibner, 1976) is characterized by rocks deposited where the nature of the underlying crust is transitional between continental and oceanic. Such transitions generally occur either on passive continental margins (e.g. Atlantic) or in active marginal mobile zones where unevenly distributed blocks of oceanic and continental crust often occur. Compared with the relatively simple geological record in oceanic and continental tectonic zones, in the transitional zone, a varied and complex record typical of orogenic belts is found. Characteristic tectonic elements include rift, continental shelf and rise, calc-alkaline, i-type volcanic and magmatic arcs; intradeep and backdeep; and transpressional "s" and "i/s" type plutonism. These rocks exhibit a complete range of deformation and metamorphism.

These three tectonic zones can exist side by side at any one time and their geographic boundaries can be identified. The location of these boundaries only changes radically following orogenesis. Thus, tectonic zones are also bounded in time by orogenies.

The Glossary of Geology (Bates and Jackson, 1980) defines orogeny as the process by which structures within mountain areas were formed, including thrusting, folding and faulting in the outer and higher layers and plastic folding, metamorphism and plutonism in the inner and deeper layers. It usually occurs over a finite period of time, is fundamentally related to consuming plate margins and the accretion of terranes, and extends over a large area (Cebull, 1973). The end of an orogeny is used here to define the boundary between tectonic zones in time. While it is recognized that orogenesis may die out gradually making the choice of a boundary somewhat arbitrary, experience has shown that a clear distinction can generally be made between molasse deposits and overlying cover rocks.

Notation and Map Representation

The notation on the Tectonic Map of Nova Scotia (Keppie, 1982) is intended to facilitate reading the map. To this end, the letters represent an abbreviation of the tectonic classification of the unit. A tectonic zone is named after the orogeny which terminates it and its classification: continental, transitional or oceanic. The abbreviated notation is the first letter of the name of the orogeny in an upper case bold type face, followed by an upper case, light type face C, T or O. The first letter of the tectonic stage in lower case italics is used as a prefix, while the first letter(s) of the tectonic element is (are) placed as a suffix in lower case letters. For example, pAlva denotes the pacific stage of the Acadian Transitional Zone, volcanic arc element.

On the Tectonic Map of Nova Scotia (Keppie, 1982), each tectonic stage is assigned one or more basic colours and each tectonic element bears a shade of colour dependent upon the stage to which it belongs.

Structural Elements, Contours and Geophysical Anomalies

Structural elements, fold traces, foliations and faults are also included on The Tectonic Map of Nova Scotia (Keppie, 1982). The symbols are the same as those on the Structural Map of Nova Scotia (Keppie et al., 1979). Fold traces and foliations are colour-coded according to the orogeny in which they formed. Faults are black with letters adjacent to the movement symbols to indicate the age of movement. Dykes are also plotted on the map because they indicate tensional stresses in the crust.

In an undeformed or mildly deformed basin, structure contours, preferably on its base or alternatively on some higher stratigraphic horizon, are used to illustrate the shape of the basin. Axes of Bouguer gravity anomalies, both highs and lows, and axes of high magnetic anomalies may also be shown.

CONCLUSIONS

The advent of plate tectonics produced a revolution in the earth sciences (Wilson, 1968) so profound that all aspects of the science of geology

required thorough re-evaluation in relation to the new theory. Tectonic mapping is one of the more direct applications, however few have been published to date based on plate tectonic theory. This may be partly due to rapid evolution of plate tectonic theory. However, in the two decades since the advent of plate tectonic theory, the basic tenets have become more precisely defined. The time is due, if not overdue, for the preparation of a new generation of tectonic maps based upon plate tectonic theory.

A scheme for preparing tectonic maps has been devised and applied to the Tectonic Map of Nova Scotia. Three categories of tectonic units were recognized and defined: zones, stages and elements. As the geological properties of tectonic elements become better defined, tectonic mapping becomes more objective.

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